

**What is Claimed is:**

1. A test apparatus for a first power circuit and a second power circuit of an electrical distribution device, said first power circuit having a first temperature, said second power circuit having a second temperature, said test apparatus comprising:

a first circuit adapted to thermally respond to the first temperature of the first power circuit of said electrical distribution device;

a second circuit adapted to thermally respond to the second temperature of the second power circuit of said electrical distribution device;

a first temperature sensor proximate said first circuit and outputting a first signal representative of the first temperature of said first power circuit;

a second temperature sensor proximate said second circuit and outputting a second signal representative of the second temperature of said second power circuit;

a third circuit determining a difference between the first and second signals; and

a fourth circuit outputting an indication signal as a function of said difference.

2. The test apparatus as recited in Claim 1 wherein said first circuit includes a line connection, which is adapted to electrically engage and thermally communicate with the first power circuit of said electrical distribution device.

3. The test apparatus as recited in Claim 2 wherein said line connection is a male plug which is adapted to electrically engage a female socket.

4. The test apparatus as recited in Claim 1 wherein said second circuit includes a neutral connection, which is adapted to electrically engage and thermally communicate with the second power circuit of said electrical distribution device.

5. The test apparatus as recited in Claim 4 wherein said neutral connection is a male plug which is adapted to electrically engage a female socket.

6. The test apparatus as recited in Claim 1 wherein said fourth circuit includes a display.

7. The test apparatus as recited in Claim 6 wherein said display is a light emitting diode.

8. The test apparatus as recited in Claim 1 wherein said fourth circuit comprises a comparator, which outputs said indication signal when the difference exceeds a predetermined value.

9. The test apparatus as recited in Claim 1 wherein said first circuit is a line circuit including a male plug connection; and wherein said first temperature sensor is a diode disposed proximate the male plug connection.

10. The test apparatus as recited in Claim 1 wherein said second circuit is a neutral circuit including a male plug connection; and wherein said second temperature sensor is a diode disposed proximate the male plug connection.

11. The test apparatus as recited in Claim 1 wherein said third circuit comprises a first resistor, a second resistor, a third resistor, a fourth resistor, and a differential amplifier having a first input, a second input and an output, said first resistor being electrically connected between said first temperature sensor and the first input of said differential amplifier, said second resistor being electrically connected between said second temperature sensor and the second input of said differential amplifier, said third resistor being electrically connected between the output of said differential amplifier and one of the first and second inputs of said differential amplifier; wherein said first and second temperature sensors have a common reference; and wherein said fourth resistor is electrically connected between the other of the first and second inputs of said differential amplifier and said common reference.

12. The test apparatus as recited in Claim 1 wherein said fourth circuit comprises a window comparator having a first reference, a second reference, an input inputting said difference, and an output having said indication signal, said indication signal being active when said difference is greater than the first reference or less than the second reference.

13. The test apparatus as recited in Claim 12 wherein said window comparator comprises a first diode; a second diode; a first comparator having a first

input, a second input, and an output; and a second comparator having a first input, a second input, and an output, the first input of said first comparator inputting said first reference, the second input of said second comparator inputting said second reference, the second input of said first comparator and the first input of said second comparator inputting said difference, said first diode being electrically connected between the output of said first comparator and the output of said window comparator, said second diode being electrically connected between the output of said second comparator and the output of said window comparator.

14. The test apparatus as recited in Claim 1 wherein said third circuit comprises a differential amplifier having a first input electrically interconnected with said first sensor, and a second input electrically interconnected with said second sensor.

15. The test apparatus as recited in Claim 14 wherein said differential amplifier has a gain of about 10.

16. The test apparatus as recited in Claim 14 wherein said first and second temperature sensors are two diodes having a forward voltage with a temperature coefficient of about 2 mV/°C.

17. The test apparatus as recited in Claim 14 wherein said differential amplifier comprises an output having a nominal voltage; and wherein said fourth circuit comprises a window comparator having an input electrically connected with the output of said differential amplifier, a first reference voltage and a second reference voltage, said first and second reference voltages defining a voltage window with the first reference voltage being above the nominal voltage of said differential amplifier and the second reference voltage being below the nominal voltage of said differential amplifier.

18. The test apparatus as recited in Claim 17 wherein a first difference between the first reference voltage and the nominal voltage of said differential amplifier is about equal to a second difference between the nominal voltage of said differential amplifier and the second reference voltage.

19. The test apparatus as recited in Claim 18 wherein said first and second differences are about 600 mV.

20. A test device for a first power circuit and a second power circuit of an electrical distribution device, said first power circuit having a first temperature, said second power circuit having a second temperature, said test device comprising:

a housing;

a first circuit substantially within said housing, said first circuit including a first electrical connection disposed from said housing and adapted to electrically engage and thermally communicate with the first power circuit of said electrical distribution device;

a second circuit substantially within said housing, said second circuit including a second electrical connection disposed from said housing and adapted to electrically engage and thermally communicate with the second power circuit of said electrical distribution device;

a first temperature sensor proximate said first circuit and said first electrical connection, said first temperature sensor outputting a first signal representative of the first temperature of said first power circuit;

a second temperature sensor proximate said second circuit and said second electrical connection, said second temperature sensor outputting a second signal representative of the second temperature of said second power circuit;

a third circuit determining a difference between the first and second signals; and

a fourth circuit displaying an indication signal as a function of said difference.

21. The test device as recited in Claim 20 wherein said electrical distribution device is a receptacle including a line socket for said first power circuit and a neutral socket for said second power circuit; wherein said first electrical connection is a first line plug adapted to electrically engage and thermally communicate with said line socket; and wherein said second electrical connection is a second neutral plug adapted to electrically engage and thermally communicate with said neutral socket.

22. The test device as recited in Claim 21 wherein said housing includes a three-terminal plug disposed therefrom, said three-terminal plug including

said first line plug, said second neutral plug and a third ground plug, which is electrically connected to said housing.

23. The test device as recited in Claim 22 wherein said housing further includes a three-terminal socket disposed therefrom, said three-terminal socket including a first line socket electrically connected to said first line plug, a second neutral socket electrically connected to said second neutral plug, and a third ground socket electrically connected to said third ground plug.

24. The test device as recited in Claim 23 wherein said three-terminal socket is adapted to electrically connect to a heater.

25. The test device as recited in Claim 20 wherein said electrical distribution device is a wiring device.